Climate Change Risk Management from a (Re-)Insurance Perspective

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Role of the (re-)insurance industry in the natural catastrophe and climate change and resilience context

Munich Re facts

- Founded 1880 in Munich
- Gross premiums written (2017): € 49.1bn
- Consolidated result (2017): € 392m
- Staff Munich Re Group (2017): 42,410 (thereof 28.6% in Reinsurance)
- Website: [www.munichre.com](http://www.munichre.com)

(Re-)Insurance

- Risk identification
- Risk measurement „price tag“
- Knowledge / data transfer
  - Vulnerability reduction
  - Resilience building
- Risk transfer

Source: Munich Re
Relevant loss events from natural hazards worldwide 1980 – 2017
Increasing frequency of weather related events

Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).
Relevant loss events from natural hazards worldwide 1980 – 2017
Increasing economic losses (after inflation adjustment)

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.
Relevant loss events from natural hazards in Australia 1980 – 2017
Weather-related events are dominating

- Meteorological events (Tropical storm, extratropical storm, convective storm, local storm)
- Hydrological events (Flood, mass movement)
- Climatological events (Extreme temperature, drought, wildfire)
- Geophysical events (Earthquake, tsunami, volcanic activity)

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Relevant loss events from natural hazards in Australia 1980 – 2017
Increasing insured losses (after inflation adjustment)

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.
Natural catastrophe loss events in Australia 1980 – 2017
Percentage distribution by peril

Number of relevant events: 570
Overall losses: US$ 85bn
Insured losses: US$ 31bn

- Geophysical events
  (Earthquake, tsunami, volcanic activity)
- Meteorological events
  (Tropical storm, extratropical storm, convective storm, local storm)
- Hydrological events
  (Flood, mass movement)
- Climatological events
  (Extreme temperature, drought, wildfire)

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Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US$.
Drivers for globally increasing losses from natural hazards

<table>
<thead>
<tr>
<th>Global increase in population</th>
<th>From 4 billion (1975) to 7.6 billion (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved standard of living</td>
<td>Middle class is growing rapidly worldwide</td>
</tr>
<tr>
<td>Concentration of people / assets in urban areas</td>
<td>Share of urban population is increasing continually: 37% (1975) - 50% (2010) - 57% (2025)</td>
</tr>
<tr>
<td>Settlement and industrialization of vulnerable areas</td>
<td>Especially coastal areas, areas close to rivers</td>
</tr>
<tr>
<td>Increase of complexity and interdependencies</td>
<td>Increasing complexity of value chains (i.e. production cycles) in industrial facilities</td>
</tr>
<tr>
<td>Climate Change</td>
<td>Intensification and accumulation of extreme weather events in certain areas</td>
</tr>
</tbody>
</table>

**Not necessarily problematic for insurers (premiums grow proportionally with risk)**

**Problematic for insurers, if risk models are not adjusted accordingly**
The NatCat Insurance Gap by income group:
still a serious issue not only in low-income countries

Since 1980 the insurance gap (uninsured losses as a share of overall losses) has significantly decreased in high-income countries (below 60%), while in low-income countries it is still >95%.

Source: Munich Re (2018)  *Income classification defined by World Bank: high-income countries GNI ≥ 12,736 US$; low-income countries GNI ≤ 1,045 US$
The NatCat Insurance Gap for Australia:
uninsured losses as a percentage of overall losses in Australia 1980 – 2017

Insurance gap decreasing esp. since the beginning of the 21st century
Are you prepared?

of hazards are rising while metropolitan areas and their value concentrations are also growing. Will your business withstand the ever-increasing perils?

Rely on the financial strength of Munich Re and our expertise as a strong partner to safely withstand large natural events, even the unexpected ones.
Global temperature anomaly 1880-2017

17 of the 18 warmest years fall in the period 2001-2017

0.84°C warmer than the average over the period 1901-2000

0.94°C increase according to the linear trend 1880-2017

Source: Munich Re, January 2018, based on data of National Centers for Environmental Information/NOAA.
Trends in hot weather in Australia

The trend in annual number of days per year >35 °C from 1957–2015. An increase of 0.2 days/year since 1957 means, on average, that there are almost 12 more days per year over 35 °C.

Source: CSIRO and Bureau of Meteorology

Growing season (April–October) rainfall deciles for the last 20 years (1996–2015). A decile map shows where rainfall is above average, average or below average for the recent period, in comparison with the entire rainfall record from 1900.

Rainfall has been very low over parts of Australia during the southern growing season.

Source: CSIRO and BoM: State of the Climate 2016
Global sea level rise 1900 - 2017

Source: Columbia University
Adaptation to increasing risks from climate change: the role of the (re-)insurance industry

Are you prepared?

Risk factors: hurricanes, typhoons, earthquakes, floods, wildfires, volcanic eruptions.

Rely on the financial strength of Munich Re and our expertise as a strong partner to safely withstand large natural events, even the unexpected ones.
Knowledge + data: key to develop adaptation measures
1: historical loss events and (potential) trends, e.g. NatCatSERVICE Tool
Knowledge + data: key to develop adaptation measures

2: Making use of hazard data – Munich Re’s NATHAN / digital intelligence
Improving economic resilience through financial adaptation mechanisms

-> impact of natcat insurance systems on GDP development

Economic recovery faster in jurisdictions with adequate risk management / risk transfer solutions

Source: Munich Re, based on von Peter et al., Bank for International Settlements, 2012
NatCat Public Private Insurance Partnerships in OECD countries with long track record – in non-OECD countries growing

Source: Munich Re / Safir (04/2017)
Best practices for ex ante disaster risk insurance schemes
governments play a pivotal role in enhancing resilience

<table>
<thead>
<tr>
<th>Protection for households/private sector</th>
<th>Sovereign risk protection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policyholder</strong></td>
<td><strong>Governments</strong></td>
</tr>
<tr>
<td>Private households or companies</td>
<td>(often the Ministry of Finance)</td>
</tr>
<tr>
<td><strong>Funding / Government role</strong></td>
<td>Part of the federal budget</td>
</tr>
<tr>
<td>Governments creates legal and regulatory framework for compulsory insurance</td>
<td>government decides about allocation of resources in cases of nat. disasters</td>
</tr>
<tr>
<td><strong>Insured interest</strong></td>
<td><strong>Public assets</strong> and/or ex-ante financing of emergency response</td>
</tr>
<tr>
<td>Private property</td>
<td>- CCRIF (emergency response)</td>
</tr>
<tr>
<td></td>
<td>- PCRIC (emergency response)</td>
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<td></td>
<td>- FONDEN (public assets)</td>
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<tr>
<td><strong>Examples</strong></td>
<td></td>
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<tr>
<td>- TCIP (EQ, fire, explosion, landslide; Turkey)</td>
<td></td>
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<tr>
<td>- NFIP (United States)</td>
<td></td>
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<tr>
<td>- Flood Re (United Kingdom)</td>
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Source: Munich Re
Munich Re's activities relating to climate change

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<tr>
<th>RISK ASSESSMENT</th>
<th>RISK TRANSFER SOLUTIONS</th>
<th>ASSET MANAGEMENT</th>
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<tbody>
<tr>
<td>Detecting and assessing climate change impacts on frequency and intensity of natural hazards</td>
<td>Realizing business growth areas as a leading provider of risk transfer solutions for renewable energies and climate change-related adaptation products</td>
<td>Supporting the expansion of renewable energies and infrastructure projects with our sustainable investment strategy</td>
</tr>
</tbody>
</table>

**Carbon neutrality of Munich Re**  
Munich: since 2009, reinsurance worldwide: since 2012, Munich Re (Group): since end 2015

**Initiating innovative climate adaptation projects**  
such as Munich Climate Insurance Initiative (MCII)

Source: Munich Re
Expect the unexpected
Scientific facts and economic impacts of natural disasters

Are you prepared?
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